

Building the future of research software as a first-class citizen in science; a global perspective

A report from the EVERSE Satellite Meeting report at the International Research Software Funders Workshop 2024

Fotis Psomopoulos¹, Chris Erdmann², Salvador Capella-Gutierrez³, Stefania Amodeo⁴, Michelle Barker⁵, Colette Bos⁶, Neil Chue Hong^{7,8}, Carole Goble⁹, Sean Goggins¹⁰, Kim Hartley⁵, Daniel S. Katz¹², Helena Ledmyr¹³, Natalia Manola⁴, Lars Holm Nielsen¹¹, Shoaib Sufi⁹, Jonathan Tedds¹⁴, Andrew Treloar¹⁵, Anelda Van der Walt¹⁶, Jonas Windhager²

¹Institute of Applied Bioscience, Centre for Research and Technology, ²SciLifeLab / Uppsala University, ³Barcelona Supercomputing Center, ⁴OpenAIRE, ⁵Research Software Alliance, ⁶Netherlands eScience Center, ⁷University of Edinburgh ⁸Software Sustainability Institute, ⁹The University of Manchester, ¹⁰CHAOSS Project, University of Missouri, ¹¹CERN, ¹²University of Illinois Urbana-Champaign, ¹³International Neuroinformatics Coordinating Facility, ¹⁴ELIXIR Hub, ¹⁵Australian Research Data Commons, ¹⁶Talarify

Summary of key actions and recommendations moving ahead.

Actions:

- EVERSE will run an assessment activity on the correlation of potential quality indicators with software quality across a range of projects, both successful (e.g., SciPy) and unsuccessful.
- EVERSE plans to conduct a survey to identify the most important and impactful software across various communities and domains. This survey will provide insights into the different aspects that contribute to a software's importance and impact.

Recommendations

- Funders should encourage and support software-related sessions at major events.
- Funders should promote the inclusion of Software Management Plans (SMPs) for all funded projects.

The [EVERSE workshop](#), held as a satellite event to the [International Research Software Funders Workshop](#), took place on Tuesday, September 10th, at SciLifeLab in Uppsala, Sweden. This full-day workshop provided an opportunity for the EVERSE project to showcase its work, receive feedback from key stakeholders, and promote networking and collaboration among attendees. The event specifically engaged Funders and Policy Makers to raise awareness of the challenges and opportunities in research software across communities, initiatives and projects, ultimately involving participants across 18 organizations (3 funders, 6 networks, and 7 research performing organizations). Participants were encouraged to bring their communities' best practices and services related to research software, such as quality, management, sustainability, and

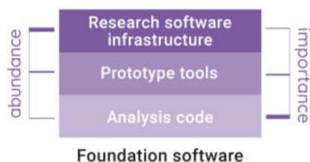
excellence, to engage with EVERSE, and establish a bidirectional communication channel for future collaboration.



Establishing a Community

How to contribute to, and engage with EVERSE

- Network (Goals, Vision, Participation [doc](#))
- RSQkit (<https://everse.software/RSQkit/>)
- Reference framework
- Training
- Recognition



EVERSE Project Overview | Fotis Psomopoulos (CERTH)

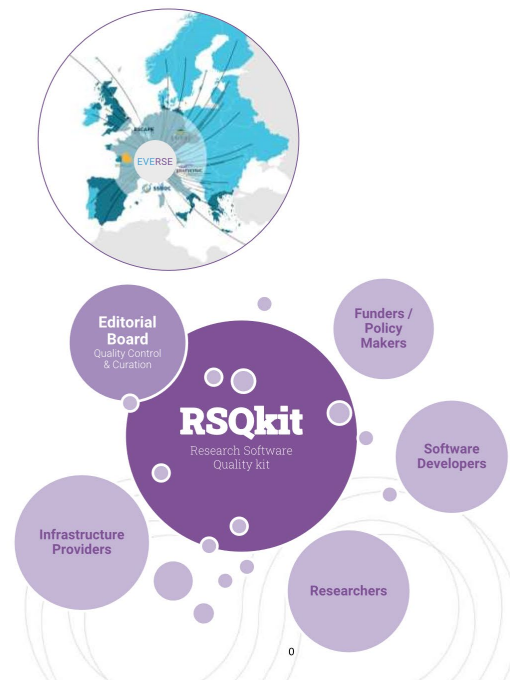


Figure 1: An overview of the key outputs of the EVERSE project that were presented in the workshop. Graphics produced also by Giacomo Peru (UEDIN/SSI).

Setting the stage

The workshop began with a number of setting-the-stage presentations, including an outline of EVERSE, an overview of SciLifeLab's initiatives around research software, and finally a quick summary of the Amsterdam Declaration on Funding Research Software Sustainability (ADORE.software).

The first presentation offered an overview of the EVERSE project, its key outcomes to date, and the roadmap looking ahead. The main focus of the project is to identify “good enough” practices for research software, coupling them with the tools and services that facilitate them, while also ensuring clear and bidirectional communication to the various scientific domains, represented by the EOSC Science Clusters, to capture their particular needs. In particular, EVERSE works closely with [OSCARS](#), a partnership that unites leading European Research Infrastructures (RIs) from the [ESFRI roadmap](#) and beyond, to advance Open Science across Europe.

A large part of the discussion revolved around the [RSQkit](#), one of the project's primary outcomes. RSQkit will be a collection of curated resources, guidelines, and good enough practices as well as training material on research software quality, tailored to meet the diverse needs of different research communities. EVERSE aims to establish RSQkit as a community resource hub for

research software, offering an open and inclusive mechanism to capture good enough practices, experiences and training for all relevant stakeholders. In this context, the **importance of expanding training opportunities globally** was particularly stressed; EVERSE will fully utilize existing initiatives (such as the [Carpentries](#)) and domain-agnostic platforms (e.g. [TeSS Training Portal](#) – recently funded to become cross-disciplinary in the OSCARS mTeSS-x project) in order to easily identify, share and reuse resources. Moreover, this effort will be very closely complemented with a targeted program to establish a coherent recognition framework for all active contributors to research software.

Ultimately, EVERSE aims to establish a comprehensive, community-driven resource hub for research software excellence. EVERSE will serve as a reference point and community hub to promote good practices, facilitate knowledge sharing, and encourage collaboration among organizations in the field of research software development.

The next presentations shifted focus to SciLifeLab's initiatives around research software. **SciLifeLab emphasized the importance of adopting standards and best practices, such as proper sharing, citation, and documentation of software.** Discussions also covered Sweden's [national guidelines](#)¹ for open science, which include software as an encoding of research methods, as well as France's Open Science Monitor, which actively tracks software usage. By hosting the EVERSE Satellite Meeting and the 3rd International Research Software Funders Workshop, SciLifeLab aims to elevate the importance of research software in national open science discussions and initiatives.

Finally, the introduction closed with a presentation of the Amsterdam Declaration on Funding Research Software Sustainability ([ADORE.software](#)), highlighting a notable update in version 1.1 of the declaration, which now permits individual signatories, building upon the groundwork laid by the DORA initiative.

Deep dives into challenges

The workshop included a number of **break-out discussions**, which attempted to delve into a few critical topics that emerged during the workshop, namely:

1. **The role of funders in ensuring the quality of research software**
2. **Approaches to addressing research software quality**
3. **The significant impact of research software on policy, and conversely, the influence of policy on software development**

The role of funders in ensuring the quality of research software

The first break-out session focused on **the role of funders in ensuring research software quality**, exploring key aspects such as **defining, assessing, and maintaining standards**. Software quality is multifaceted, involving attributes such as reliability, usability, maintainability, and efficiency.

¹ Reference link: <https://www.kb.se/samverkan-och-utveckling/nytt-fran-kb/nyheter-samverkan-och-utveckling/2024-08-27-national-guidelines-for-open-science---now-in-english.html>

Key components that contribute to quality include comprehensive documentation, clear metadata (e.g., licensing and resource locations), and robust testing processes. It was noted that while testing can help evaluate quality, it does not inherently improve it in all aspects. Funders can play a vital role in endorsing, monitoring, and periodically reassessing software quality. For instance, [INCF](#)'s re-endorsement process, conducted every two years, helps ensure software remains both relevant and valuable. However, there are ongoing debates about the extent of funder involvement. Some participants suggested dashboards to track the health of software and its communities, while others advocated for regular assessment intervals. Additionally, the need for **clear licensing and comprehensive Software Management Plans (SMPs)** was emphasized to ensure transparency around software reuse and maintenance.

Key recommendations:

- Funders should support software-related sessions at major events (ADORE).
- Funders should promote the inclusion of Software Management Plans (SMPs) for all funded projects.
- EVERSE should lead a mapping activity on the usefulness vs effort required for SMPs.

[Approaches to addressing research software quality](#)

The second break-out session focused on **assessing software quality**, with particular attention to **how quality standards differ based on the type or purpose of the software**. For instance, software developed for local use may have different quality drivers than software intended for distribution. The session underscored the importance of impact assessment, which funders frequently require, though researchers often find this process burdensome. Participants noted that defining and enforcing good practices is more motivating and effective than merely filling out forms. While universally agreed-upon metrics for software quality are lacking, **process-related indicators** – such as community health and sustainability metrics (e.g. community involvement, the number of stars or forks, and the frequency of code updates) – **may serve as useful benchmarks for the way the software is being developed**. Quality is often subjective and context dependent. Software designed for personal use may prioritize different attributes than software intended for broader distribution, where reusability and reproducibility become essential, even if they are not always the primary focus. Metrics like unit testing coverage, community size, and code maintenance practices often correlate with software quality and can provide rough assessments. However, it should be noted that **all these proxies and indicators are just that – they are "signs" but they do not actually directly measure quality**. As such and given that many of these measures are capturing activity, it raises the open question – and key challenge – of **what is meant by quality**. Additionally, the cyclical nature of grant funding often results in "fallow periods" for scientific software, which can affect long-term maintenance and sustainability. Finally, the session highlighted the critical non-linear relationship between software quality, sustainability, and impact, noting that software sometimes achieves unintended uses. This observation raises important questions about how to measure and sustain these so far unforeseen impacts. Participants also discussed the aspirational goal of synthesizing these ideas to improve software quality while considering long-term sustainability and unintended consequences. The notion of balancing "fit for purpose" with reusability was explored, using the analogy of a Swiss army knife – while versatile, it may perform some tasks (like using the corkscrew) poorly.

Key action:

- EVERSE will run an assessment activity on the correlation of potential quality indicators with software quality across a range of projects, both successful (e.g., SciPy) and unsuccessful.

The significant impact of research software on policy, and conversely, the influence of policy on software development

The third break-out session focused on **Science Policies for a Better Research Future**. Current policy approaches focus heavily on assessment and judgment, and often discourage innovation and engagement. There is a need to **shift towards policies that encourage participation, creativity, and progress**. Policies should focus on positive incentives rather than judgment, creating an environment where researchers and software developers feel supported. Research software is crucial but often underrecognized and underfunded. Funders and policymakers need to include software in their evaluations and funding decisions, as seen with institutions and initiatives like [Wellcome](#)² and the [Dutch Strategy Evaluation Protocol](#)³. There is an apparent disconnect between policymakers and researchers: policies should be developed collaboratively, incorporating feedback from all levels of researchers to align with their needs. Additionally, policies need to be backed by adequate infrastructure and resources to be effective. Instead of rigid assessments, we should promote policies that encourage meaningful outcomes. Using approaches like the "[theory of change](#)"⁴ to align policies with real-world benefits will help create a more supportive research environment.

Key action:

- EVERSE plans to conduct a survey to identify the most important and impactful software across various communities and domains. This survey will provide insights into the different aspects that contribute to a software's importance and impact.

Road ahead

The workshop attempted to tackle a wide range of open questions around research software, and the role of key stakeholders (such as funders and global/regional initiatives) to address them.

One clear recommendation that emerged was to **encourage the inclusion of Research Software Engineer (RSE) sessions at major conferences**, with funders sponsoring or supporting these sessions, making them a natural and integral part of the event. Drawing from [INCF's](#) experiences, traditional conferences may not always be engaging or attract the desired RSE attendees. A more effective strategy would be to **allocate funding directly to individuals or groups dedicated to**

² <https://wellcome.org/grant-funding/guidance/policies-grant-conditions/data-software-materials-management-and-sharing-policy>

³ https://storage.knaw.nl/2022-06/SEP_2021-2027.pdf

⁴ <https://www.theoryofchange.org/what-is-theory-of-change/>

improving software practices in their fields⁵. Allowing these experts to independently organize sessions at their own or related domain conferences could have a significant impact, potentially influencing initiatives like ADORE.software to recommend funding community outreach in this way. Moreover, these would act as a catalyst in professionalizing and establishing the role of the Research Software Engineer in research support units, similarly to the role of the Data Steward.

Another clear point is the lack of consensus on assessing the quality of research software. Indicators like unit testing, community size, and code maintenance practices may correlate with software quality and could provide rough assessments. However, there are currently no universally agreed-upon metrics for evaluating research software quality. There are some process-related indicators, primarily geared towards capturing community involvement and software development activity, but ultimately quality depends largely on context, such as whether the software is for personal use or wider distribution.

Finally, some effort is required in order to systematically produce impact data on software. This can be achieved through several methods, an example being surveying the community (domain-specific) on what are the most important pieces of software, in order to produce a radar picture of the key features that appear to contribute to impact (expecting different profiles for different software).

Ultimately, the path forward must be first and foremost a community-driven effort, closely supported by organizations, initiatives and funding agencies alike, in order to establish a common understanding, interpretation and adoption of research software “good-enough” practices.

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⁵ This seed corn funding approach is taken in initiatives such as the [Software Sustainability Institute’s Fellowship Programme](#) and the [Netherlands eScience Centre Fellowship Programme](#).